

TOUCH-SENSITIVE ELECTRONIC APPARATUS FOR MEDIA APPLICATIONS, AND METHODS THEREFOR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Patent Application No. 60/592,483, filed Jul. 30, 2004, entitled "TOUCH SENSITIVE TECHNIQUES AND INPUT DEVICES," which is hereby incorporated herein by reference.

[0002] This application is also related to: (i) U.S. patent application Ser. No. 10/840,862, filed May 6, 2004, entitled "MULTIPOINT TOUCHSCREEN," which is hereby incorporated herein by reference; (ii) U.S. patent application Ser. No. 10/903,964, filed Jul. 30, 2004, entitled "GESTURES FOR TOUCH SENSITIVE INPUT DEVICES," which is hereby incorporated herein by reference; and (iii) U.S. patent application Ser. No. 10/654,108, filed Sep. 2, 2003, entitled "AMBIDEXTROUS MOUSE," which is hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] The present invention relates to electronic devices and, more particularly, to touch-sensitive electronic devices.

[0005] 2. Description of the Related Art

[0006] Mixing boards or consoles are known and used in sound production. The mixing boards or consoles are dedicated devices that primarily amplify and equalize signals on various channels. A mixing board or console can, for example, support a large number of channels, such as 24 or 32 channels. Users are often intimidated by the many knobs, switches and sliders that are compactly provided on the mixing board or console.

[0007] Traditionally, the knobs, switches and sliders are manually manipulated by the user of the mixing board or console. However, more recently, mixing boards or consoles have permitted some of its controls (e.g., faders, equalizers) to be automatically adjusted, such as during a playback. Furthermore, in recent years, mixing board or consoles have become more digital, such as by including a small display screen in the mixing board or console. Also, in recent years, software programs that execute on general purpose computer, such as GarageBand™ and Logic Pro 6™ from Apple Computer, Inc., permit mixing capabilities for sound productions.

[0008] Unfortunately, however, these conventional approaches do not fully satisfy user needs. For example, the traditional mixing consoles tend to be fixed and inflexible. As another example, the software applications tend to provide greater flexibility but have limitations with respect to user interaction. Thus, there is a need for improved approaches to providing digital mixing boards or consoles.

SUMMARY OF THE INVENTION

[0009] Broadly speaking, the invention relates to an electronic apparatus for media applications, such as an electronic

mixing apparatus or an electronic keyboard apparatus, as well as associated methods for use of the electronic apparatus.

[0010] According to one aspect of the invention, the electronic mixing apparatus is provided on a touch screen that provides user input and display capabilities. In one embodiment, the touch screen is a multipoint touch screen so that multiple user touch inputs can be simultaneously acquired. The touch screen can display a Graphical User Interface (GUI) having mixing controls that can be selected and manipulated through user touch inputs with the touch screen. In one embodiment, the mixing controls being displayed with the GUI can be modified in real time as a user provides touch inputs with the touch screen.

[0011] Another aspect of the invention pertains to surface guides that are provided on the touch screen to assist with user input. The surface guides can be a permanent part of the touch screen or a removable part of the touch screen. In one embodiment, the surface guides can be part of an overlay sheet that can be affixed to the touch screen.

[0012] Still another aspect of the invention pertains to an electronic keyboard apparatus. The electronic keyboard apparatus (e.g., virtual keyboard) is provided on a touch-sensitive apparatus capable of simultaneously acquiring multiple user touch inputs.

[0013] The invention can be implemented in numerous ways, including as a method, system, device, apparatus, or computer readable medium. Several embodiments of the invention are discussed below.

[0014] As a touch-sensitive apparatus operating as a media mixer, one embodiment of the invention includes at least: a touch screen having a display area that also operates as a touch input area; and a plurality of media mixing controls being displayed in the display area of the touch screen and being interactive with a user through interaction with the touch input area of the touch screen.

[0015] As a method for operating a computing device having a touch screen, one embodiment of the invention includes at least the acts of: displaying a mixing console Graphical User Interface (GUI) having a plurality of GUI objects on the touch screen; determining whether at least one touch input has been detected; identifying the one or more GUI objects that are associated with the at least one touch input; determining modifications to the one or more identified GUI objects based on the at least one touch input; updating the one or more identified GUI objects of the mixing console GUI to reflect the modifications; and determining input data based on the at least one touch input and the one or more identified GUI objects.

[0016] As an electronic media mixer, one embodiment of the invention includes at least: a multi-touch touch screen capable of concurrently receiving multiple touch inputs; and a computing device operatively connected to the multi-touch touch screen. The computing device is configured to: display a mixing console Graphical User Interface (GUI) having a plurality of GUI objects on the multi-touch touch screen; determine whether at least one touch input has been detected; identify the one or more GUI objects that are associated with the at least one touch input; determine modifications to the one or more identified GUI objects based on the at least one touch input; update the one or more